

PATENT SPECIFICATION

NO DRAWINGS

Inventor: SYDNEY RUBACK

848,429

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COMPLETE SPECIFICATION

Improvements in and relating to Filter Plugs for Cigarettes, Cigarette Holders and like Smokers' Appliances

We, CIGARETTE COMPONENTS LIMITED, a British Company, of Friendly House, 21—23 Chiswell Street, London, E.C.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention is concerned with improvements in or relating to filter plugs for cigarettes, cigarette holders and like smokers' appliances.

It is already known from British patent specification No. 765,963, in the manufacture of such filter plugs, to treat a tow of cellulose acetate filaments with a plasticiser so as to render the filaments adhesive and, after forming them into a rod, to cause or allow them to bond together at their points of mutual contact. One such method, for example, comprises the steps of separating the individual filaments of a crimped continuous filamentary tow by opening out the same to form a ribbon-like web of relatively large width and small thickness, subjecting this web to a spray of liquid plasticiser which is compatible with and is a solvent or softener for the filaments, collecting the liquid-treated tow under controlled tension and presenting it to a garniture whereby it is formed into a cylindrical rod, covering the rod with a wrapper, e.g. of cigarette paper, severing the rod to appropriate lengths and, before or after the severing of the wrapped rod, heat-treating it in order to assist bonding together of the filaments at the points where they are in contact with one another.

Where the liquid plasticiser used is capable of exerting an appreciable solvent action at room temperature, the heat treatment may be dispensed with and the bonding effected by allowing the rods to stand for a sufficient time at room temperature to allow the filaments to bond together at their points of contact.

It is also known from British Patent Specification No. 744,449 to produce a tobacco

smoke filtering element by a method which includes the steps of forming an uncompacted bundle of fibres of cellulose acetate or the like into a condensed and more compact rod-like fibrous mass and then subjecting this condensed mass of fibres to heat or treating it by other means in such a manner as to weld the mass into a structurally unitary rod having an outer shell or skin of coalesced surface fibres having a continuous relatively smooth surface. The fibres enclosed within this outer shell or skin may also, as a result of the heat or other treatment, be welded to each other at random points along their lengths, so that they will be retained in position within the outer skin or shell partly by such welding and partly by the compaction of the rod and the resulting interlocking between the fibres. The coalescence of the surface fibres is achieved principally by solvation or fusion of the fibres in the outer surface layers of the condensed bundle, the term "solvation" being used here to mean the creation of an adhesive, tacky or readily bonding condition by solution or incipient solution of the fibres or portions of the surfaces thereof. The structurally unitary rod referred to above may subsequently be cut to the required lengths and enclosed in known manner within an extension of the paper wrapping of a cigarette. As already mentioned, the coalescence of the fibres in the surface regions of the bundle and the interwelding of the interior fibres may be effected wholly or mainly by means other than heat treatment. These results may for example be produced by means of a solvent spray projected onto the bundle either before, or after, or before and after the condensing operation. Moreover, after being sprayed with a solvent in this manner, the bundle may be heated at a high temperature in an oven in order to aid the rod formation.

The use of smoke filter plugs or elements produced by these known methods has up to now been attended by the difficulty that the filling when bonded exerts practically no pres-

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sure in a radial direction against the surrounding wrapping and that there is therefore a tendency for it to become displaced easily from the latter. It is possible to overcome this difficulty by applying to the wrapping, before forming it into a tube round the filling, a strip or strips of liquid adhesive which stick the cellulose acetate to the wrapping. This procedure is, however, open to certain objections. For example, the water in the adhesive can cause cockling of the wrapping if as is usual the latter consists of cigarette paper, thus distorting the shape of the finished filter plug. Moreover, any carelessness in applying the adhesive can result in the latter being transferred to moving parts of the filter making machine, thereby impairing the steady running thereof. The addition of this extra step, i.e. the application of a strip or strips of liquid adhesive to the wrapping paper, also adds to the difficulties of operation and control. In addition, the bond obtained between the filling and the paper wrapping is not entirely satisfactory, because it does not extend round the entire circumference of the filter plug.

It is an object of this invention to overcome these difficulties.

A further object is to provide an improved filter plug, the filling of which is stuck to the wrapping tube around its entire circumference, so that any tendency for the filling material to shrink away from this tube either during storage or during smoking is eliminated.

Yet another object is to provide an improved method of making such a filter plug; which, in the case where the filter plug has a lapped longitudinal joint, eliminates the tendency for a flat to be produced along the joint in the finished plug; which is cleaner, simpler and more rapid than known methods; which eliminates the tendency for adhesive to accumulate on the cut-off knife of the plug-making machine, in the ledgers or underneath the front folder of the garniture; and which enables the pasting attachment, which is normally used in cigarette filter plug-making machines, to be dispensed with.

The improved method according to the present invention comprises the steps of treating with a solvent plasticiser bulked filaments of a material the surface of which is capable of being rendered adhesive by said solvent plasticiser; forming the filaments so treated into a rod; enclosing said rod, while the surfaces of the filaments are still adhesive and wetted with the solvent plasticiser, within a paper tube coated, on the surface forming the inside of the tube, with a material capable of being thereby rendered adhesive by said solvent plasticiser; and either causing or allowing the filaments not only to bond to one another at their points of mutual contact, but also to bond to the coating on the paper tube at their points of contact with said coating.

The filaments are preferably composed on a

secondary cellulose acetate.

The coating on the paper tube may consist of a thermoplastic synthetic resin such as vinyl acetate or a vinyl-acetate-vinyl-chloride copolymer, in which case the bonding of the filaments to one another and to the coating may be effected by the application of heat applied externally to the paper tube or, in the case where the liquid plasticiser is capable of effecting the bonding at room temperature, by allowing the smoke filtering elements to stand for a sufficient time for the bonding to be effected.

The paper tube advantageously has a longitudinal lapped joint formed by overlapping the longitudinal edge parts of the paper strip from which the tube is to be formed. A heater bar pressing gently upon the joint is then used to seal these edge parts together by means of the thermoplastic coating on the outer overlapping part. It is sometimes advantageous that the quantity of thermoplastic synthetic resin on the inner surface of the overlapping margin of the paper from which the tube is formed should be increased as compared with the quantity applied to the remaining paper surface which is to form the inside of the paper tube.

This invention also includes a tobacco smoke filtering element having a filling composed of filaments bonded by solvent action to one another and to a coating on the inside surface of an enclosing wrapping tube of paper, the filaments preferably being composed of a secondary cellulose acetate and the coating on the paper tube preferably consisting of a thermoplastic synthetic resin.

While a preferred material for the filaments is a secondary cellulose acetate, the filaments may be composed of other thermoplastic materials capable of being brought into an adhesive condition by the application of a liquid plasticiser. Typical examples of such other thermoplastic materials are polyacrylonitrile, polyvinyl acetate and polyvinyl acetate/chloride copolymer.

EXAMPLE I.

A crimped Tow composed of 8,750 filaments of 8-denier secondary cellulose acetate was loosened by passing it through two pairs of differential speed rollers, sprayed with a solvent plasticiser consisting of triacetin to give an addition of 9% by weight and then formed into a rod and wrapped with a paper strip by conventional means. The paper strip was provided, on the side in contact with the filling, with a coating of 12g/m² of polyvinyl acetate and by overlapping the adjacent edges of the strip a lap joint was sealed by the application of a heater bar which fused the coating on the outer overlap onto the uncoated outer surface of the underlying edge. The rod was then cut into 90 mm. lengths. After standing overnight it was found that the fibres of the filling were bonded to each other and to the internal coat-

ing of the enveloping paper strip.

EXAMPLE II.

The procedure of example I was repeated using a Tow composed of 16,000 filaments each of 5 denier of 88:12 Vinyl chloride/Vinyl acetate fibres and in each case spraying on a 12% addition of a solvent plasticiser consisting of Dimethyl glycol phthalate. After standing for 24 hours the fibres were found to be bonded to each other and to the coating.

WHAT WE CLAIM IS:—

1. A method of manufacturing tobacco smoke filtering elements, comprising the steps of treating with a solvent plasticiser bulked filaments of a material the surface of which is capable of being rendered adhesive by said solvent plasticiser; forming the filaments so treated into a rod; enclosing said rod, while the surfaces of the filaments are still adhesive and wetted with the solvent plasticiser, within a paper tube coated, on the surface forming the inside of the tube, with a material capable of being rendered adhesive by said solvent plasticiser; and either causing or allowing the filaments not only to bond to one another at their points of mutual contact, but also to bond to the coating on the paper tube at their points of contact with said coating.

2. A method as claimed in claim 1, wherein the coating on the paper tube consists of a thermoplastic synthetic resin.

3. A method as claimed in claim 2, wherein the bonding of the filaments to one another and to the coating is assisted by the application of heat applied externally to the paper tube.

4. A method as claimed in claim 2 or 3, wherein the paper tube has a longitudinal lapped joint formed by overlapping the longitudinal edge parts of the paper strip from which the tube is to be formed and a heater bar is pressed gently upon the joint to seal these edge parts together by means of the thermoplastic coating on the outer overlapping part.

5. A method as claimed in any of the preceding claims, wherein the filaments are composed of a secondary cellulose acetate.

6. A tobacco smoke filtering element having a filling composed of filaments bonded to one another and to a coating on the inside surface of an enclosing wrapping tube of paper by solvent action.

7. A tobacco smoke filtering element as claimed in claim 6, wherein the filaments are composed of a secondary cellulose acetate and the coating on the paper tube consists of a thermoplastic synthetic resin.

8. A method of manufacturing tobacco smoke filtering elements substantially as described with reference to Example I.

9. A method of manufacturing tobacco smoke filtering elements substantially as described with reference to Example II.

10. A tobacco smoke filtering element made by the method claimed in any one of claims 1 to 5, 8 or 9.

REDDIE & GROSE,

Agents for the Applicants,

6, Bream's Buildings, London, E.C.4.

PROVISIONAL SPECIFICATION

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tension and presenting it to a garniture whereby it is formed into a cylindrical rod, covering the rod with a wrapper, e.g. of cigarette paper, severing the rod to appropriate lengths and, before or after the severing of the wrapped rod, heat-treating it in order to effect bonding together of the filaments at the points where they are in contact with one another.

Where the liquid plasticiser used is capable of exerting an appreciable solvent action at room temperature, the heat treatment may be dispensed with and the bonding effected by allowing the rods to stand for a sufficient time at room temperature to allow the filaments to bond together at their points of contact.

The use of filter plugs produced by this method has up to now been attended by the difficulty that the filling when bonded exerts practically no pressure in a radial direction against the surrounding wrapping and that there is therefore a tendency for it to become displaced easily from the latter. It is possible to overcome this difficulty by applying to the

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wrapping, before forming it into a tube round the filling, a strip or strips of liquid adhesive which stick the cellulose acetate to the wrapping. This procedure is, however, open to certain objections. For example, the water in the adhesive can cause cockling of the wrapping if as is usual the latter consists of cigarette paper, thus distorting the shape of the finished filter plug. Moreover, any carelessness in applying the adhesive can result in the latter being transferred to moving parts of the filter making machine, thereby impairing the steady running thereof. The addition of this extra step, i.e. the application of a strip or strips of liquid adhesive to the wrapping paper, also adds to the difficulties of operation and control. In addition, the bond obtained between the filling and the paper wrapping is not entirely satisfactory, because it does not extend round the entire circumference of the filter plug.

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Yet another object is to provide an improved method of making such a filter plug: which in the case where the filter plug has a lapped longitudinal joint, eliminates the tendency for a flat to be produced along the joint in the finished plug; which is cleaner, simpler and more rapid than known methods; which eliminates the tendency for adhesive to accumulate on the cut-off knife of the plug-making machine, in the ledgers or underneath the front folder of the garniture; and which enables the pasting attachment, which is normally used in cigarette filter plug-making machines, to be dispensed with.

The improved method according to the present invention comprises the steps of treating with a solvent plasticiser filaments of cellulose acetate, or of a synthetic thermoplastic material the surface of which is capable of being partly dissolved or softened and thereby rendered adhesive by said solvent plasticiser; forming the filaments so treated into a rod; enclosing said rod, while the surfaces of the

fibres are still adhesive and wetted with the solvent plasticiser, within a tube of paper or the like coated, on the surface forming the inside of the tube, with a material capable of being partly dissolved or softened by said solvent plasticiser and thereby rendered adhesive; and either causing or allowing the filaments not only to bond to one another at their points of mutual contact, but also to bond to the coating on the paper tube at their points of contact with the latter.

The coating on the paper tube may consist of a thermoplastic synthetic resin such as vinyl acetate or a vinyl-acetate-vinyl-chloride copolymer, in which case the bonding of the filaments to one another and to the coating may be effected by the application of heat applied externally to the paper tube or, in the case where the liquid plasticiser is capable of effecting the bonding at room temperature, by allowing the filter plugs to stand for a sufficient time for the bonding to be effected.

The paper tube advantageously has a longitudinal lapped joint formed by overlapping the longitudinal edge parts of the paper strip from which the tube is to be formed. A heater bar pressing gently upon the joint is used to seal these edges together by means of the thermoplastic coating on the outer overlapping part.

This invention also includes a filter plug having a filling composed of filaments of cellulose acetate or like thermoplastic material bonded by solvent action to one another and to a coating on the inside surface of an enclosing wrapping tube of paper or the like.

While a preferred material for the filaments is cellulose acetate, certain other cellulose derivatives may be employed such as cellulose propionate, cellulose butyrate, cellulose acetate/butyrate and other organic acid derivatives of cellulose. Alternatively the filaments may be composed of a synthetic thermoplastic material capable of being brought into an adhesive condition by the application of a liquid plasticiser, of which polyacrylonitrile, polyvinyl acetate and polyvinyl acetate/chloride copolymer are typical.

REDDIE & GROSE,
Agents for the Applicants,
6, Bream's Buildings, London, E.C.4.